DETECT PUZZLING PATTERNS

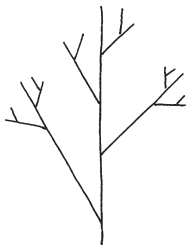
From tree rings to turtle shells, nature's patterns are both beautiful and perplexing. Why do things form patterns as they grow? Is there a secret? Is their growth predictable?

LOOK FOR DESIGNS IN NATURE

Walk around the campground, visit the nature center, or hike through the park looking for patterns. Did you find any of the patterns described on this page? Write about or draw pictures of the patterns in the boxes below.

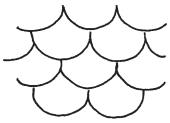
branching patterns

As living things grow, they may branch out. Look at the arrangements of leaves on a twig. Check out lightning bolts and bark beetle carvings.



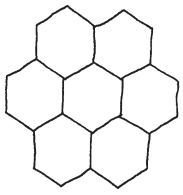
overlapping patterns

Animals depend on their body coverings to protect them from wind, rain, and cold. Look for overlapping patterns on fish, birds, and reptiles.



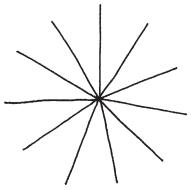
compact patterns

Nature tries to make the best use of space. Look for tight-fitting patterns in honeycombs, flower seedheads, and pine cones.



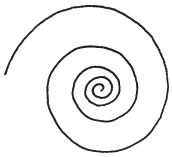
exploding patterns

You can find patterns that reach out in many directions by looking at seedheads, mushroom gills, conifer needles, and rosettes (like dandelions).



spiral patterns

Look for snail shells, galaxies, sunflower seedheads, spiderwebs, and curled up millipedes.



_____ patterns

Draw pictures or describe other patterns you see.

FINDING NUMB3RS IN N8TURE

Some of the patterns you find in nature are more than just artistic and perplexing. Some patterns seem to follow mathematical equations. If you go looking for numb3rs in n8ture, you will find them! Take Fibonacci (FEE buh NAW chee) numbers, for example.

In the Fibonacci sequence, each number after the first two is the sum of the previous two numbers.

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, . . .

Start looking for these numbers in nature, and you will find a whole new way to explore the outdoors.

COUNT FLOWER PETALS

Count the number of petals on 5 to 10 different flowers. Track your numbers in these boxes.

Circle the Fibonacci numbers. Did Fibonacci numbers show up more often than you expected?

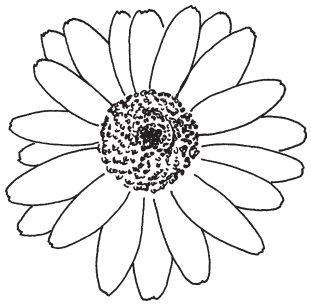
Sketch flowers with different numbers of petals.
Remember to take care of all wildflowers. Sketch, don't pick!

3 petals
iris, lily, trillium

5 petals
violet, buttercup, rose, columbine, milkweed

8 petals
coreopsis, delphinium

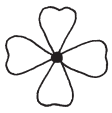
13 petals
marigold



21 petals
black-eyed susan, chicory, aster

34, 55, or 89 petals
plantains, daisies, asters, sunflowers

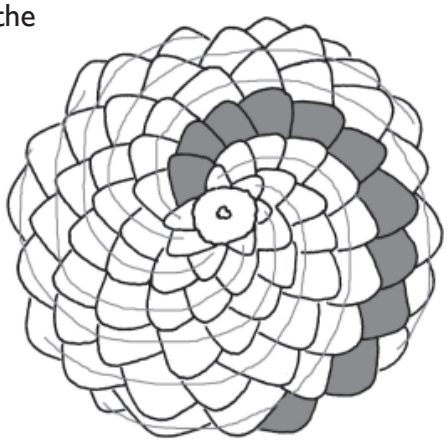
Draw flowers you found with 4, 6, 7, or 9 petals. These are **not** Fibonacci numbers.

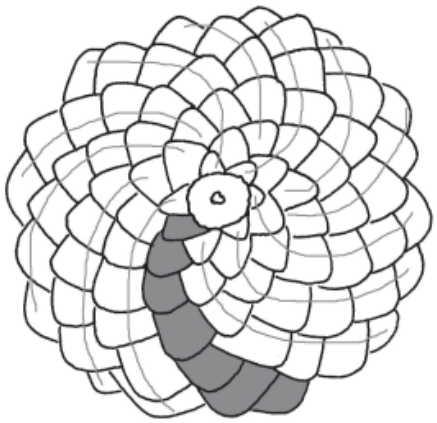


CHECK OUT SPIRALS

Fibonacci numbers also show up in the number of spirals found on seedheads (like sunflowers) and pine cones.

Find a pine cone and look at it from the bottom. Count the number of spirals going from the center of the cone (where it attached to the tree) to the outside edge. Count the spirals in both directions. The resulting numbers are usually two consecutive Fibonacci numbers. In the example shown, there are 8 clockwise spirals and 13 counter-clockwise spirals. Can you find a pine cone that doesn't follow this pattern?

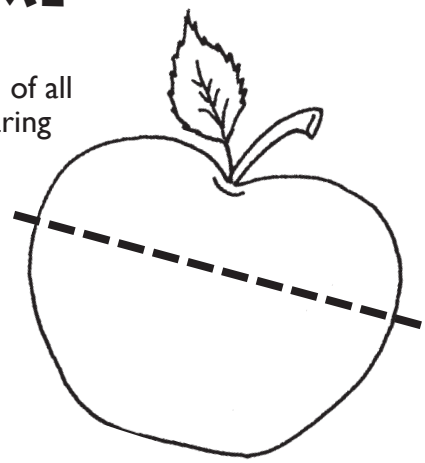




EAT SOME FRUIT

Do the flowers of all edible fruit-bearing plants have five petals?

Cut an apple in half through the middle. What do you see? Surprised?



I searched and counted. I think Fibonacci numbers are . . .

- ☐ Absolutely amazing!
- ☐ A bizarre coincidence that is WAY overrated.

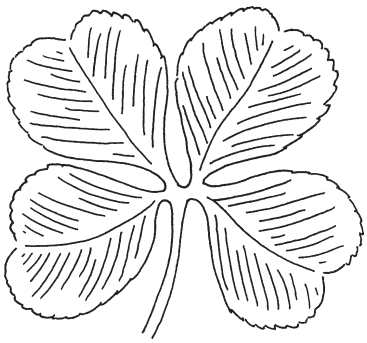
I detected puzzling patterns by . . .

- ☐ Looking for designs in nature.
- ☐ Counting flower petals.
- ☐ Checking out the spiral patterns on pine cones.
- ☐ Looking at apples and other edible fruits.
- ☐ Eating pineapple and asparagus after counting the spirals!

THINK ABOUT IT!

Nature is complicated. If you look long enough you can find exceptions to every rule.

Just spend some time looking for a four-leaf clover. You know that most clovers have three leaves. However, if you are patient and lucky, you will find a four-leaf clover.



The same is true of other patterns in nature. If you look long enough, you will find a plant or animal that breaks the rules. It might have too many petals, grow too tall, or be the *wrong* color. That's what makes nature so exciting. No matter how much you see, there is always something new to explore.

FIND OUT MORE

By Nature's Design by Pat Murphy

If you like math and want to learn more, visit ***Fibonacci Numbers and the Golden Section*** (Professor Ron Knott's Web page) <www.mcs.surrey.ac.uk/Personal/R.Knott/Fibonacci/>